

## A Low Power Rad-Hard ADC for the KID Readout Electronics, Phase I

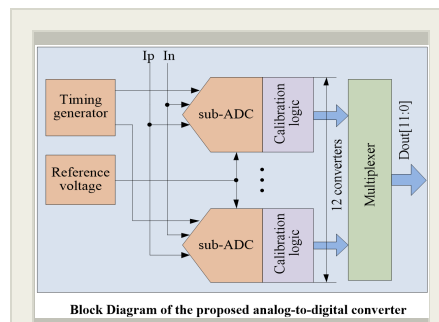
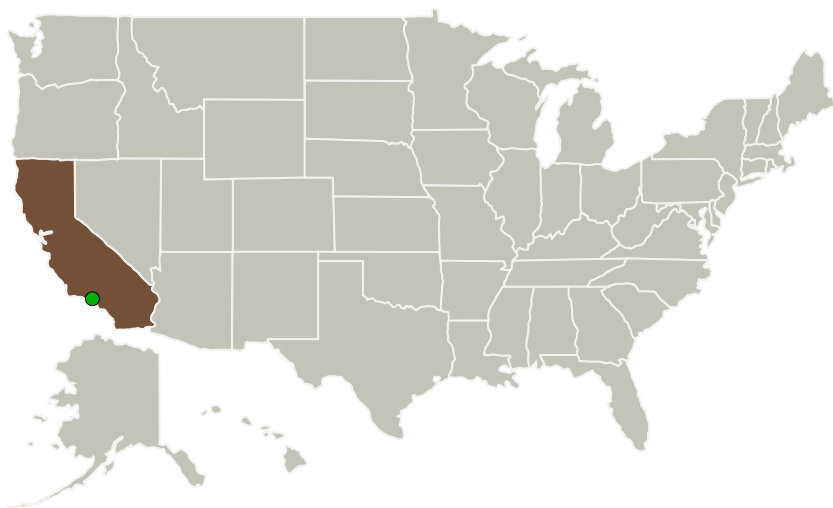


Completed Technology Project (2017 - 2017)

## Project Introduction

The proposal aims to develop a radiation hardened analog-to-digital converter (ADC) required for the Kinetic Inductance Detector (KID) readout electronics. KIDs are developed for photometers and spectrometers for astrophysics focal planes, and earth or planetary remote sensing instruments. ADCs employed in space based KIDs are required to combine several features: radiation hardness, low power consumption, high resolution and high-sampling rate to facilitate increase in the number of the readout tones and to reduce the size of the electronics. The proposed SAR ADC aims to achieve a 12-bit resolution and the lowest to date reported figure of merit (FOM) at the 1GSps rate. A number of innovations will be introduced to the ADC in order to combine low power consumption (below 100mW) with the signal to noise and distortion ratio (SINAD) of at least 65dB. Tolerance to at least 4Mrads of total ionizing dose (TID) radiation and immunity to the single event effects (SEEs) will be achieved by employing radiation hardening techniques such as RHBD, RHBL and RHBS. A novel calibration technique for the capacitor mismatch will be introduced to improve linearity and increase the sampling rate. The proposed calibration technique introduced to the sub-ranging architecture with application of the asynchronous SAR logic will facilitate reduction of switching power. Phase I work will provide the proof of feasibility of implementing the proposed ADC. Phase II will result in the silicon proven ADC prototypes being ready for commercialization in Phase III.

## Primary U.S. Work Locations and Key Partners



A Low Power Rad-Hard ADC for the KID Readout Electronics, Phase I Briefing Chart Image

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## A Low Power Rad-Hard ADC for the KID Readout Electronics, Phase I



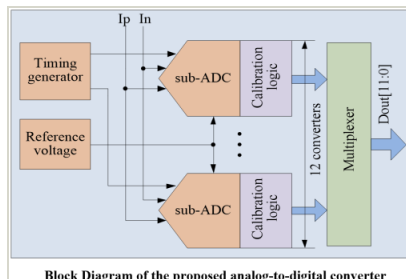
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Organizations Performing Work	Role	Type	Location
Pacific Microchip Corporation	Lead Organization	Industry	Culver City, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California

## Images



## Briefing Chart Image

A Low Power Rad-Hard ADC for the KID Readout Electronics, Phase I  
 Briefing Chart Image  
 (<https://techport.nasa.gov/image/128044>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Pacific Microchip Corporation

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

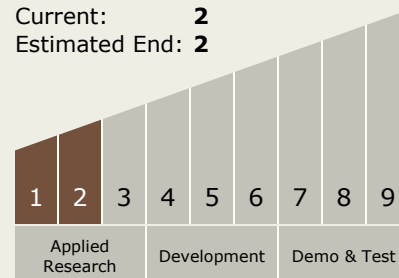
Carlos Torrez

## Principal Investigator:

Aliaksandr Zhankevich

## Technology Maturity (TRL)

Start: 1  
 Current: 2  
 Estimated End: 2



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## Technology Areas

### Primary:

- TX02 Flight Computing and Avionics
  - └ TX02.1 Avionics Component Technologies
    - └ TX02.1.6 Radiation Hardened ASIC Technologies